and so far as possible to be practically examined. In the case of the higher degrees, such as D.Lit. and D.Sc., original work on the part of the student is an essential preliminary to his getting the degree, and even with lower degrees provision is made for anyone showing any practical originality to be excused a certain part of the usual theoretical book work.

It is, of course, understood that these regulations will require a stronger professorial staff to man the colleges of the universities than if merely theoretical instruction had to be given. A good many of the colleges attached to the Indian universities, indeed all the largest and most important, are directly managed by the Indian Government, and it is on the action of this body that to a large extent the effective working of the new Indian University Act will depend. The colleges must be dealt with liberally in the matter of staff, or the Act will be inoperative, for if Government colleges, with the resources of Government behind them, do not take the lead, it is useless to expect any others to work up to the desired standard.

An important article in the influential Indian newspaper, *The Pioneer*, of October 31, describes the condition of things in the Indian colleges as being rather critical at the present time. The following is an extract from the article:

"The first commotion created by Lord Curzon's measures of University Reform has died away long ago; but it must not be overlooked that the work merely initiated by new Acts and sets of Regulations has yet to be actually done, and that rather momentous issues depend on the spirit in which it is done. We are reminded of this by certain papers of a controversial nature, written by members of the Bengal Educational Service, into which we have been allowed an insight. The controversy on the face of it would appear to be one of purely local interest, turning on the question whether the present professorial staff of the Presidency College, Calcutta, is adequate to the demands made on College teaching by the new Regulations of the University. But a perusal of the papers shows that matters of deep importance—the future of all teaching, learning and research in this country are involved in the discussion. An educational officer specially deputed by Government to report on the state and requirements of the Presidency College maintains that if the College is to satisfy the new demands on teaching the Science Professors must at once largely curtail the research work in which they have been indulging in the past, and another officer, closely connected with the College, in endorsing these remarks, tells us that research in the Presidency College has of late become something of a bogey,' even demonstrators and assistants being 'involved in researches.' This, he assures us, has led to neglect of pure teaching, and the first measure demanded by the new era of higher education is that the entire staff, from the senior professors downwards, should put aside their researches which, as far as the interests of the College are concerned, are not only useless but positively injurious. Against these views the Science Professors maintain that they and their subordinates have not neglected, and do not mean to neglect, 'teaching,' but that research and training in the methods of research constitutes an important, in fact essential, element in all higher stages of instruction. It is evident that what is being discussed here is no less than the entire future character of the upper sections of our large Colleges and the standing of their Professors. Is it to be a principle recognised, and eventually to be enforced, that Professors lecturing to B.A., B.Sc., M.A., and M.Sc. classes must limit themselves to *mere* teaching, whereby the antagonists of research evidently understand the assiduous inculcation into the minds of students of established facts and theories with the special aim of training the recipients of knowledge rapidly to reproduce in writing at examination time as much of the matter committed to memory as they can possibly manage; or should higher teachers in our Colleges be encouraged, possibly definitely expected, to combine with such teaching efforts to rouse in their students the appetite and capacity for original work and research? The latter alternative, of course, would imply that the men to whom higher teaching is entrusted should not be mere schoolmasters, but should themselves take some active part in the advancement of knowledge and learning."

It is greatly to be hoped that the Indian Government will seize the opportunity and properly strengtnen all its colleges with professors who are investigators as well as teachers, and thus at once set a proper standard for the highest education in India. On the action taken now the future of Indian education largely depends, and on the giving of a proper education to the future leaders of the Indian community will depend the peace, progress and prosperity of our Indian Empire.

NOTES.

WE understand that Sir Norman Lockyer has been in communication with the French Minister of Public Instruction with the view of securing active support for the science section of the Franco-British Exhibition to be held in London this year. The Minister has referred the matter to the Paris Academy of Sciences, and it is hoped that the result will be a satisfactory and substantial representation of scientific work in France at the forthcoming exhibition. The various divisions of the British section of the exhibition were described in NATURE of November 21, 1907 (p. 67). This section was instituted with the assistance of the British Science Guild, and is in the course of organisation by a committee including leading representatives of all branches of pure science. The British committee has been given an area of eleven thousand square feet, gratis, for the purpose of exhibiting apparatus, appliances, and results of scientific research. This free grant of space is equivalent to a gift of about 3000*l.*, and in addition the committee has been granted a sum of money in aid of the science section. The executive committee of the British side of the exhibition has thus provided a very favourable opportunity of exhibiting some of the achievements of scientific research and enlightening the general public as to the instruments or methods employed. It is the duty of the men of science of Great Britain to show appreciation of this generous treatment by assisting the committee in every way within their power to make the science section of the exhibition instructive, illuminating, and inspiring to the many thousands who will visit it.

SIR GEORGE DARWIN, K.C.B., F.R.S., has been elected a foreign correspondant of the Paris Academy of Sciences in the section of geography and navigation. Lord Brassey has also been elected a correspondant of the academy.

PROF. RAPHAEL MELDOLA, F.R.S., past-president of the Chemical Society, has been elected president of the Society of Dyers and Colourists in succession to the late Sir W. H. Perkin.

IT is announced in *Science* that Mr. Andrew Carnegie has added 400,000*l.* to the endowment of the Carnegie Institution of Washington.

SIR OTTO JAFFE, president of the Belfast Natural History and Philosophical Society, has taken preliminary steps to form a committee to honour the memory of Lord Kelvin by erecting a statue or other suitable memorial in his native city of Belfast.

WE regret to see the announcement of the death of Sir Alfred B. Garrod, F.R.S., in his eighty-ninth year. Dr. Garrod graduated as M.D. of the London University

in 1843, and became a Fellow of the Royal College of Physicians in 1856. He was elected a Fellow of the Royal Society in 1858, and received the honour of knighthood in 1887.

THE Belgian Government is organising an Arctic meteorological expedition which will start next summer. The *Revue scientifique* announces that the expedition will be under the command of M. Georges Lecointe, director of the Royal Observatory at Uccle.

REUTER'S representative has received details regarding the Antarctic expedition which is being organised by Dr. Jean Charcot, who hopes to start in July, and expects to be absent for two years. Sufficient provisions to last three years will, however, be taken. The expedition is bent on scientific work. The best route to the Pole is, Dr. Charcot thinks, by way of the Ross Barrier, but this he regards as belonging to English explorers. and does not propose to travel that way. On reaching the Antarctic it is proposed to return to Graham Land, and endeavour to reach Alexander Land, where it is hoped a barrier similar to that of Ross's will be found. The expedition will then endeavour to go as far south as possible. An important part of the equipment will be motor-sledges, which are being built by the Marquis de Dion. With these sledges experiments will be made in the Alps during this winter. The ship for the expedition will be specially strong in view of the ice pressure, and will be of barquentine rig, with compound engines of 550 horse-power. She is to be 135 feet in length, with a beam of 30 feet, and will carry 230 tons of coal and 100 tons of provisions. The crew will consist of twenty-two men, ten of whom were members of Dr. Charcot's last expedition. The scientific staff, in addition to the leader, will number three naval officers, two zoologists, one geologist, and one physicist for magnetic and photographic work. The French Chambers have voted 12,000*l.*, while another sum of equal amount will also be voted by Parliament. Private subscriptions have yielded 2600*l.*, and Dr. Charcot is endeavouring to get a further 3400*l.* The Academy of Sciences has prepared the scientific programme, and the Committee of Missions of the Ministry of Public Instruction has drawn up a favourable report on the subject of the proposed journey. The Marine Department is giving the necessary coal and a valuable collection of scientific instruments, while the Oceanographical Institute of Paris, founded by the Prince of Monaco, is also helping.

IN his presidential address to the Royal Society on November 30, 1907, Lord Rayleigh referred to a movement to promote the publication of standard scientific works in embossed type suitable for the use of the blind. Mr. H. M. Taylor, F.R.S., has written out the whole of Mr. C. Smith's "Elementary Algebra" in Braille type; and the embossed edition of this work, consisting of five large royal quarto volumes, containing in the whole eight hundred pages, has been published by the British and Foreign Blind Association at the price of 16*s.* 6*d.* The blind who are interested in subjects of a scientific character are heavily handicapped, because an embossed copy of any book occupies a much larger space than a printed copy of the same book, and is therefore expensive to produce. The result is that though books in embossed type are needed on such subjects as mechanics, physics, astronomy, chemistry, and geology, very few blind persons could afford to purchase these books if their prices were comparable with that at which the embossed edition of the algebra has been published. Accordingly, a fund has been formed to assist the publication, for the use of the blind, of embossed books on scientific subjects at prices which would not be so high as to be almost prohibitive. This object would be attained by making grants from the fund to Braille printers towards the cost of embossing the plates from which the books are printed. It is thought that 600*l.* or 800*l.* would form a fund large enough to test the usefulness of the scheme, and would be ample for an experiment to last three or four years. The sum of about 300*l.* has already been subscribed or promised in support of the scheme. Donations may be paid to the secretary, Mr. H. M. Taylor, F.R.S., Trinity College, Cambridge, or direct to the "Embossed Scientific Books Fund" at the Cambridge branch of Messrs. Barclay and Co.'s Bank.

THE weather for 1907 affords several features of interest, and the results obtained for London from the observations of the Meteorological Office probably differ somewhat from the common expectation. The aggregate rainfall for the year is 19·5 inches, which is 4·9 inches less than the average for the past thirty-five years. The only months with an excess of rain were April and December. Rain fell on 162 days, and one of the special features of the year was the great frequency with which rain occurred. In October rain fell on twenty-two days, although the aggregate rainfall for the month showed a deficiency of 0·47 inch on the average. The mean temperature for the year was 50°·2, which is 0°·1 above the average. The highest mean in any month was 60°·8, in August, and the mean for each of the three summer months was considerably below the normal. The lowest monthly mean was 38°·5, in February, and with this exception all the six winter months had a temperature in excess of the average. The total range during the year was 57°, the highest temperature being 80°, in September, and the lowest 23°, in January. There were during the year only thirty-four frosty nights, and of these thirty-three occurred in January to March. The sun shone for 1234 hours, which is ninety hours in excess of the average. The Registrar General's returns show that the death-rate for the year was 15·2 per 1000 persons living; this is probably the lowest on record, so that however unpleasant the weather for the year may have proved, there has been a decided gain on the score of mortality.

THE contents of the first three numbers of the Records of the Indian Museum include a large number of papers, chiefly devoted to invertebrates, among which attention may be directed to a series, by Dr. Annandale and others, on the fauna of brackish-water pools at Port Canning.

IN the course of a paper on a collection of fishes from Victoria (Australia), published in the October (1907) issue of the Proceedings of the Philadelphia Academy, Mr. H. W. Fowler describes two new species of sea-horse, which, together apparently with the New Zealand *Hippocampus abdominalis*, are referred to the new subgenus Macleayina, on account of the greater number of long dorsal fin-rays in comparison with the more typical representatives of the group.

THE barnacles in the collection of the U.S. National Museum form the subject of a long paper by Dr. H. A. Pilsbry constituting Bulletin No. 60 of the museum. Only the pedunculate group and the members of the sessile family Verrucidæ are, however, dealt with in this communication. Hitherto the pedunculate species recorded from American waters number about a dozen, while the Verrucidæ have been unknown; the author is now enabled to raise the numbers of the former group to fifty-six, and to add five species of the latter.

IT has long been a matter of common knowledge that squirrels aid the forester by burying nuts, of which some sprout and ultimately develop into trees, but that he is also indebted to earthworms for aid of a similar nature is claimed by Mr. E. A. Andrews in the November (1907) number of the *American Naturalist* to be a new discovery. In America it appears that the dry, flat fruits of the silver-maple are frequently employed by worms to plug the apertures of their burrows, in the fashion long since described by Darwin. In districts too dry for them to germinate under ordinary conditions, a certain proportion of maple-seeds thus drawn into their holes by the worms were found to sprout and grow into seedlings, and although these ultimately perished under the influence of the late summer drought, the author is of opinion that under less unfavourable conditions a certain number would survive. Worms, he concludes, "probably more than amend, by planting trees, the damage with which they are credited through destroying seedlings in gardens."

EARLY in 1906 Prof. W. B. Benham communicated to NATURE (vol. lxxiii., p. 559) a note to the effect that the doubts expressed a short time previously with regard to the alleged carnivorous habits of the kea were not justified by the facts. Since that date he has been endeavouring to obtain more definite information on the subject, and the results of his investigation are published in the Transactions of the New Zealand Institute. A second investigator, Mr. G. R. Marriner, of Canterbury College, has likewise been pursuing inquiries, apparently independently, on the same subject, a summary of which is also published in the same volume. Both writers are in accord in regarding the accusation against the kea of worrying sheep for the sake of feeding on their flesh as now fully proved, and both likewise agree that the prime object of attack is not the kidneys and kidney-fat. Mr. Marriner, in addition, records some very interesting facts concerning the breeding-habits of this bird, notably that the eggs are laid and the young reared in mid-winter at an elevation of between three and four thousand feet above sea-level, where the winter cold is intense.

RATS, in connection with plague, form the subject of a pamphlet and two articles recently published in India. In the first number of Memoirs of the Indian Museum, Dr. W. C. Hossack gives an account of the species of rats found in Calcutta, illustrated with several coloured and other plates, and a key to their identification. The so-called Indian mole-rat (*Nesocia bengalensis*) appears to be the species most abundant in the Indian metropolis, where it is probably the one most concerned in the dissemination of plague, as it is extremely common in grain-stores, which are notorious as being centres whence the disease has spread. Originally a field-hunting, grain-storing species, it has in Calcutta become a parasitic inhabitant of stables, grain-stores, &c. "Aids to the Identification of Rats connected with Plague" forms the subject of a pamphlet, by the same author, published by the trustees of the Indian Museums, and printed at the Pioneer Press, Allahabad. Finally, to the third part of another new zoological journal—Records of the Indian Museum—Captain C. A. Gourlay contributes a note on the rats of Dacca, eastern Bengal, where the black rat (*Mus rattus*) is the most abundant species.

No. 18 of the *Bulletin biologique* (Dorpat) contains an editorial article on the need for exhibitions devoted to modern biological technique. It is pointed out that the progress of biological science is now so dependent upon improvements in technique, while the methods in use are so varied and elaborate, and demand an acquaintance with so many branches of science, that without exhibitions of this nature it is almost impossible for workers to keep thoroughly abreast of the times, or to find out in what direction improvements are required. Histology, for example, cannot advance without the aid of chemistry, while the physiologist is largely dependent upon the aid of the mechanician. Similarly, there is a close connection between the study of the tissues and minute structure of animals and optics. It is recommended that an exhibition of this nature should be divided into the following main sections:—(1) methods of collection; (2) the care of living animals and plants; (3) preservation of specimens; (4) transport of living organisms; (5) anatomical methods; (6) methods of microscopic work; (7) methods of studying development; (8) methods of chemical investigation of animal structures; (9) physiological research; (10) the methods of bacteriological investigation; (11) methods of illustration; (12) modelling; (13) museum installation and arrangement.

To the *Times* of December 26, 1907, Sir T. Digby Pigott contributes further information concerning the luminous owl recently seen in Norfolk, from which it appears that the phenomenon was observed by several independent witnesses. A letter from a Welsh fisherman is quoted to the effect that on the night of December 12, 1907, the woollen garments of the writer and his companions were observed to be luminous, and that such phenomena have long been known is demonstrated by an extract from a work published in London in 1704. A very important piece of evidence appeared in the issue of the *Times* of the same date, with the signature of "A Country Teacher." In this the writer states that in February, 1890, he first noticed a luminous appearance in a pair of barn-owls, which then inhabited a farm-building near his school, in Somersetshire. "I saw the luminosity several times," he writes, "but it was not so bright as Sir Digby Pigott's correspondent observed, and usually lasted only for a short time, though I could see the birds flying about after the luminous gleam had ceased. I never saw both birds luminous at the same time, and I am unable to say whether the male or female, or both, possessed this power. . . . I thought the luminosity might be connected with the electrical condition of the atmosphere, but though it was usually brightest and lasted longest when the electrical potentiality of the atmosphere was highest, it was not always so. . . . I could observe nothing to indicate that the luminosity was under the control of the owl." The writer also mentions that the phenomenon was perfectly familiar to the children in his school, who spoke of the bird as a "glim ullert."

THE importance of cacao cultivation in Grenada is evident from the report for 1906–7 of Mr. R. D. Anstead, superintendent of the botanic station. Plots have been established in five districts with the view of instructing peasant proprietors, and some of the planters have laid out large experimental areas on their estates for carrying out manurial tests. Seedling sugar-canes, of which the variety D. 95 was distributed, cacao, coffee, and bananas were the economic plants chiefly in demand, also seeds of Castilloa and Hevea. A feature of the report is the inclusion of several photographs. The collection of palms, amounting to eighty named species, contains many valuable kinds for the seeds of which there is a brisk demand.

PROF. A. C. SEWARD contributes to the Transactions of the Geological Society of South Africa, vol. x., a description of a collection of Permo-Carboniferous plants from Zululand and Natal. The material contained a large number of specimens referable to Glossopteris, but few of the forms were distinct. Sporangia were discovered on some of the leaves of *Glossopteris indica*, but this does not preclude the possibility of the genus being a pteridosperm; in this respect the association of small winged seeds with the leaves was noted. Other specimens referred to are the genera Phyllotheca, Bothrodendron, Vertebraria, and Cordaites. The specimens do not furnish sufficient evidence for determining the precise horizon in the Permo-Carboniferous system of the coal-bearing strata of Zululand and Natal.

THE Memoirs of the College of Science and Engineering, Kyoto Imperial University, Japan, of which the current issue (vol. i., No. 3) has been received, contains original memoirs by members of the University. Of the thirteen papers, eleven are written in English and two in German. The subjects dealt with comprise the equilibrium between reciprocal salt pairs, reaction between carbonic acid and lead acetate in an aqueous solution, experiments on the utilisation of scrap metal, formation of amines from the halogen imido esters, the refining of copper, electrolytic dissociation of partially neutralised weak acids, short-period magnetographs, the theory of the rotary converter, Beckmann's rearrangement, determination of the solubility of a given substance by means of Pulfrich's refractometer, and dynamometer car experiments. The varied nature of this list affords an indication of the large amount of attention that is now being devoted to research work in pure science in Japan. Of the papers dealing with applied science, that by Mr. D. Saito on the refining of copper should be carefully studied by metallurgists. The author has made a systematic study of the process of dry refining, his investigations having been made upon the blister copper from the Beshi mine in Japan. The blister copper, which is comparatively pure, is refined in a reverberatory furnace using coal as fuel, and the author finds that the greater part of the impurities is oxidised in the earlier stages of refining. Thus, after the end of the first rabbling, the copper contains only 0·03 per cent. of iron and 0·003 per cent. of sulphur, whilst after the second rabbling the iron contents remain almost unchanged, and the copper is practically free from sulphur. If the copper could be re-melted more quickly and the third rabbling period dispensed with, there would be a great economy in fuel and labour. The effect of the first poling is so great that the second poling seems unnecessary, or at least could be shortened.

MR. J. W. PATTERSON, of the Technical College, West Hartlepool, has sent us two very successful colour photographs of rock sections taken between crossed Nicols. They were taken by the Lumière autochrome process, the illuminant being an electric arc light, and reproduce very satisfactorily the interference colours given by plagioclase felspar, augite, and olivine. It is obvious that this places in the hands of teachers of petrology and geology a very useful aid for illustrating lectures. Autochrome photographs are most successful with slides which are fairly transparent, and should be inspected in a strong light. Mr. Patterson has also obtained photographs of the interference figures yielded by uniaxial and biaxial crystals in convergent polarised light. Some weeks ago we saw a series of colour photographs of this kind exhibited in Kelvingrove Museum, Glasgow. Three-colour photographic plates appeared two years ago as illustrations of an annual report of the Geological Survey of the Transvaal, and about the same time Prof. E. J. Garwood showed some colour lantern slides of rock sections at the Geological Society, which were the finest of their kind we have seen. They were taken by the Sanger Shephard process, we believe. Undoubtedly methods of colour photography will prove to be of great use in reproducing microscopic slides, not only of rocks, but also of other subjects.

IN *Symons's Meteorological Magazine* for December, 1907, Mr. W. Ellis, F.R.S., formerly superintendent of the magnetical and meteorological department of Greenwich Observatory, gives a useful summary of Greenwich air-temperature observations published for the sixty-five years 1841–1905. The lowest mean daily temperature, 37°·47, is reached on January 12; after February 12 the rise towards spring begins, receiving, however, a slight check in the last week of April. The highest mean daily temperature, 64°·01, is reached on July 15; after August 13 there is a continuous fall to the minimum of winter. The mean annual temperature is 49°·56; the warmest year is 52°, in 1868, and the coldest 46°·28, in 1879. The mean monthly temperature is 38°·6, in January, and 62°·7, in July. The absolute highest reading was 97°·1, on July 15, 1881, and the absolute lowest 4°, on January 9, 1841. The observations give no information on secular change, for which purpose a much longer period than sixty-five years is necessary; there are several interesting differences shown by dividing the series into groups, but Mr. Ellis states that these are clearly due to accidental causes. Nor is any influence traceable to sun-spot variation, which the author considers is practically insignificant in all questions of weather change.

AT the meeting of the Royal Academy of Sciences of Amsterdam of October 26, 1907, an interesting paper by Dr. E. Van Everdingen was read on the relations between mortality of infants and high temperatures. It had been previously pointed out in a paper published by the Statistical Bureau of Amsterdam that a distinct maximum in the mortality of children under one year of age existed in the summer months, but an endeavour to find any connection between this maximum in various places and the monthly means of temperature only led to a negative result, although it was still thought probable that the mortality was due to fluctuations of temperature. Following up this idea, Dr. Van Everdingen tabulated the meteorological data for various places in several different ways, one of which was to extract the days on which the temperature exceeded 25° C. between the middle of one month and that of another. In this case the agreement between the deviations of mortality and the number of hot days was so satisfactory that little doubt remains that the high temperatures must be considered as the cause of the increased mortality. The author expresses the hope that, with the aid of other temperature limits and possibly with other methods of grouping the observations, those competent in medical matters will feel inclined to trace the more direct relations of the phenomenon.

IN the *Physical Review* for November, 1907, Mr. W. P. White, of the geophysics laboratory of the Carnegie Institution at Washington, makes a thorough examination of the potentiometer methods of measuring temperature by means of the resistance thermometer or the thermoelectric junction, in order to determine the best arrangement to use in melting-point measurements. He comes to the con-

clusion that the thermoelectric method is the better, that the best time of swing of the galvanometer is five seconds, and that greater use should be made of galvanometer deflections than is done at present, so as to reduce as far as possible potentiometer manipulations. Slide wire potentiometers should be avoided, switch instruments being much more satisfactory, and leakage disturbances should be prevented by surrounding the circuit with a continuous or nearly continuous metallic shield.

THE September (1907) number of *Terrestrial Magnetism and Atmospheric Electricity* contains an abstract, by Mr. J. A. Fleming, of the results obtained by the Ziegler Polar Expedition of 1903–5. Astronomical, survey, tidal, meteorological, and magnetic observations were made during one year at several stations in the Franz Josef Archipelago. Two new maps embody the results of the survey, and indicate the two channels by which the tidal wave from the Atlantic reaches the archipelago. The mean barometric pressure was 29·6 inches, and the mean temperature 8° F.; the mean declination 22° east, the dip 83° north, and the total intensity 0·57 C.G.S. unit. The morning maximum of easterly diurnal declination occurred between five and six o'clock, and the afternoon minimum between eight and nine o'clock.

THE employment of the conversion temperatures of crystallised salts as fixed points in thermometry has been shown recently to possess a real practical value, sodium sulphate having been shown to give the point 32°·383, and sodium bromide 50°·674, both on the international hydrogen scale. In a recent number of the *Zeitschrift fur physikalische Chemie* (December 3, 1907) Messrs. T. W. Richards and Franz Wrede put forward manganese chloride, $MnCl_2+4H_2O$, as a suitable substance for another fixed point. One re-crystallisation of the commercially pure salt is sufficient to give a point within o°·06 of its final value, and after six re-crystallisations the point is fixed to within o°·001 C. A simple and effective form of thermostat is described and figured, by means of which the correction for the emergent column is reduced to one or two thousandths of a degree. The transition temperature of the tetrahydrate into the dihydrate of manganese chloride is finally given as 58°·089, with a limit of error of ±o°·005.

THE number of the *Zeitschrift* referred to above contains a paper by Mr. A. Hantsch giving the result of experiments on the cryoscopic behaviour of sulphuric acid. It is shown that, as a criterion of purity, the cryoscopic method far surpasses the ordinary analytical method. The pure monohydrate H_2SO_4 melts at 10°·46, and the addition of either water or sulphur trioxide causes a lowering of the melting point. This result is confirmed by conductivity measurements, the maximum melting point corresponding with the minimum electrical conductivity. It was found possible to determine the molecular weight of various organic substances, methyl sulphate, trinitrobenzene, phthalic anhydride, &c., in pure sulphuric acid, and from the mean results of nine substances by the application of van 't Hoff's formula a latent heat of fusion of 22·94 calories was deduced. The latent heat of fusion, directly determined, was found to be 22·82.

WE have received from Messrs. Philip Harris and Co., Ltd., Birmingham, a copy of their latest price list of chemical apparatus and chemicals. A special feature of this list is the arrangement into sections, which is likely greatly to facilitate its use. The earlier sections deal with general apparatus, such as instruments for weighing and measuring, apparatus of glass, porcelain, and metal, thermometers, microscopes, spectroscopes, &c.; each of the later sections deals with apparatus used in a special branch of chemistry, for example, brewing, iron and steel analysis, mining, cements, oils, fats and waxes, water and agricultural analysis. Sections are also devoted to physicochemical work, and to driving, stirring, and shaking apparatus. The list is admirably printed and illustrated, and is furnished with a very complete index.

A SERIES of striking addresses delivered on the occasion of the inauguration of Dr. W. A. Noyes as professor of chemistry at the University of Illinois has been printed in *Science* (vol. xxvi., No. 673, pp. 689–714). Prof. H. A. Webber, in discussing the relation of chemistry to agriculture, emphasised in particular the great improvement both in quantity and quality of agricultural crops owing to the utilisation of the results of modern science. Dr. McMurtrie, speaking on the relation of chemistry to the industries, dealt with the need of developing the power and judgment of the industrial chemist by research work carried out in university laboratories; the fact that scientific research is a nation's "greatest financial asset" was especially emphasised. Prof. J. Stieglitz, while deploring the lack of active investigators in the past among teachers in American universities, pointed out that recently there has been a great development in all branches of research, especially since Clark University and the University of Chicago were founded mainly with this object in view. The American teacher is, however, still as a rule overburdened with an excessive amount of routine work, consisting of lecturing, laboratory instruction and administrative duties, and is seldom afforded aid by the provision of suitable research assistants; funds also are too often lacking. Prof. G. B. Frankforter, in discussing the teaching of chemistry in State universities, pointed to the wonderful growth of German chemical industry as a specimen of what can be done by hearty cooperation between the universities and the leaders of industry of a nation. Chemistry has too often been taught in such a way as to convey the idea that it "serves no other purpose than to be simply dabbled with in college laboratories"; it is not therefore to be wondered at that few realise that its "laws and principles are the foundation stones of our great industrial structures." In his speech on the contribution of chemistry to modern life, Prof. Noyes took as his keynote the supreme importance of purely scientific work undertaken without reference to its technical application; he illustrated his subject by referring to the history of the coal-tar colours and the development of several industries from a purely scientific nucleus. The speeches, taken collectively, constitute a powerful plea for greater support and sympathy being accorded to purely scientific work.

THE second edition, revised and enlarged, of "A Bibliography of the Works of Sir Isaac Newton, together with a List of Books illustrating his Works, and Notes," by Mr. G. J. Gray, will be published this month by Messrs. Bowes and Bowes, Cambridge.

MESSRS. GEORGE PHILIP AND SON, LTD., have sent us two specimen sheets of their "Imperial" series of maps. The price of each sheet is 2*s*. 6*d*., but the maps can also be obtained on cloth, with rollers and varnished, at 3*s*. 6*d*. each. Each sheet is about 28 inches by 19 inches, and contains several physical maps. One sheet provides a map of the world in hemispheres, showing physical features in the familiar shades of green, brown, and blue, together with three maps of the world indicating isobars, rainfall.

and regional vegetation respectively. The other sheet includes maps of the polar regions on a scale of 1 : 35,000,000, and three isothermal maps of the world.

WE have received two volumes of the "Agricultural Statistics of India" for the years 1901–2 to 1905–6. The statistics have been compiled in the office of the Director-General of Commercial Intelligence for the Department of Revenue and Agriculture of the Government of India. The first volume deals with British India, and the second with native States. The total area of India is given as 1,133,977,169 acres (1,771,839 square miles), and the total area of the British provinces is 744,907,040 acres (1,163,605 square miles). From a prefatory note to vol. i. the actual area of British India for which statistics are prepared appears to be 557,236,906 acres (870,683 square miles). Less than two-thirds of this area is available for cultivation; 67,976,325 acres are under forests, and land absolutely barren or unculturable, or covered by buildings, water, and roads, and so on, amounts to 135,329,173 acres. The balance represents the area available for cultivation, of which 207,683,741 acres were actually cropped during the year. Detailed information is supplied in the volumes as to the kind of crops and extent of each, the live-stock, revenue, and transfers of land. Full particulars as to the production of tea and coffee are also supplied. The table dealing with the estimated number of acres on which indigo is cultivated, and the yield in hundredweights, reveals the interesting fact that there was a revival in the indigo industry during 1906–7. The number of acres under cultivation and the yield both show a decided increase over 1905–6, and the yield an increase over that of 1904–5, but both sets of numbers still show a great falling off when compared with 1903–4.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN JANUARY:—

Jan. 2–3. Epoch of January meteors (Radiant 230° + 53°).
3. 1h. 51m. to 6h. 42m. Transit of Jupiter's Satellite IV. (Callisto).
,, Total eclipse of the Sun, invisible in England.
4. 17h. Neptune in opposition to the Sun.
5. 8h. 20m. Venus in conjunction with Moon. Venus 0° 45′ N.
15. 3h. 32m. to 7h. 14m. Transit of Jupiter's Satellite III (Ganymede).
17. 4h. 19m. to 4h. 34m. Moon occults δ Geminorum.
19. 2h. 57m. Jupiter in conjunction with Moon. Jupiter 1° 33′ S.
,, 11h. 56m. Minimum of Algol (β Persei).
22. 6h. 48m. to 10h. 31m. Transit of Jupiter's Satellite III. (Ganymede).
,, 8h. 45m. Minimum of Algol (β Persei).
25. 5h. 34m. Minimum of Algol (β Persei).
29. 9h. Opposition of Jupiter to the Sun.
,, 10h. 4m. to 13h. 46m. Transit of Jupiter's Satellite III. (Ganymede).

DANIEL'S COMET, 1907*d*.—In No. 4223 of the *Astronomische Nachrichten* (p. 375, December 20, 1907) Herr Kritzinger publishes a continuation of his ephemeris for comet 1907*d*, extending from January 1 to March 5. From this we see that the comet is now apparently travelling, very slowly and in a direction nearly due east, through the constellation Libra. On January 1 its position was $\alpha = 14h.\ 47m.$, $\delta = -9°\ 14'$, and its computed magnitude was 9·9. On February 1 the position will be $\alpha = 15h.\ 8m.$, $\delta = -9°\ 0'$, and its magnitude 10·2. Thus, on the latter date, the comet will be very near to the star β Libræ, and during the present month it will rise some five hours before sunrise.

EPHEMERIS FOR ENCKE'S COMET.—According to elements published in No. 4222 of the *Astronomische Nachrichten*, as an abstract from the *Bulletin de l'Académie des Sciences de St. Petersbourg*, 1907, Encke's comet should arrive at perihelion on February 22. An ephemeris, calculated by M. Kamensky and Frl. Korolikov, is given for the period January 3 to April 30. On the former date the comet's position will be α (app.) = 23h. 1m. 30s., δ (app.) 1° 45′·7; after that it will apparently move in a north-easterly direction through the constellation Pisces in a line nearly parallel to the stars γ, ι, and ω Piscium, being very near to ι on February 4.

ABSOLUTE SCALE OF PHOTOGRAPHIC MAGNITUDES.—The November (1907) number of the *Astrophysical Journal* (No. 4, vol. xxvi., p. 244) contains a description of a method devised by Messrs. J. A. Parkhurst and F. C. Jordan for the absolute photographic magnitudes of stars. An ingeniously constructed sensitometer box is employed for illuminating certain areas of a photographic plate simultaneously by lights differing in intensity by a known ratio. Plates thus prepared were measured for the opacity of the different areas by means of a Hartmann "mikrophotometer," which was also used to measure the opacity of the extra-focal star images. A comparison of the results obtained for the Pleiades stars with those published by Schwarzschild proved satisfactory, and indicated that within narrow limits the scale obtained was correct. It also showed that the method is capable of yielding results of extreme accuracy over a range of about two magnitudes on a single plate; that it should prove useful for determining the light curves of Algol-type and short-period variables is shown by some results given in the paper.

ANNUAL ASTRONOMICAL PUBLICATIONS.—The *Annuaire* for the year 1908, published by the Bureau des Longitudes, is of the usual form, and, in addition to its numerous invaluable astronomical tables, occupying 400 pages, it contains some 360 pages of chemical and physical data. Of the six appendices, dealing with astronomical subjects, we would direct our readers' particular attention to two, the first by M. Bigourdan on "Les Distances des Astres," the second by M. E. Guyou describing "L'Équatorial d'Astronomie pratique de l'Observatoire de Montsouris."

The *Companion to the Observatory* is practically of the same form as in previous years. The increase in the number of known variable stars renders it impossible to add all the new ones to the list, year by year, so it has been decided to reduce the number of ephemerides given, subsequently adding to them if it proves desirable. Complete lists of the Algol variables are given, but only a selected few of the ephemerides. The "inferred" magnetic elements for 1908 (Greenwich) are:—dec., 15° 55′ W.; horizontal force, 0·1854 (C.G.S.); dip, 66° 55′.

Mr. Arthur Mee's card calendar, "The Heavens at a Glance, 1908," is of the usual form, and is an extremely useful publication for astronomical observers. It may be obtained from Mr. Mee, Llanishen, Cardiff, price 7*d*. post free.

THE CANYON DIABLO METEORITES.—Part ii., vol. iv., of the Smithsonian Miscellaneous Collections (p. 203, No. 1725) contains an interesting illustrated discussion of the Canyon Diablo meteorites, by Messrs. G. P. Merrill and Wirt Tassin. The former discusses the distribution and physical characters of the "shale balls" found in such large quantities in the vicinity of the canyon in Coconino County, Arizona. These balls are roughly globular in outline, of all weights up to 50 lb., and consist of an exterior coating of hydrated oxide of iron frequently enclosing unoxidised iron centres, or nuclei, the intermediate shell showing a green hydroxide of nickel mingled with oxides of iron. The inspection of a number of these balls and of the ground in which they are found apparently strengthens the theory of the meteoric origin of the crater.

Mr. Tassin deals with the chemical analysis of the "finds," and shows that these "shale balls" differ to some extent in their chemical composition from the ordinary Canyon Diablo iron. They contain appreciable quantities of chlorine, whereas none has been found in the ordinary "iron," and also contain more phosphorus; to the presence of these two elements the increased oxidation of the "shale balls" may be ascribed.